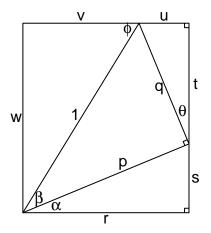
In terms of α and β , express all the lengths and other angle measures (θ and ϕ).



Variable	Algebraic expression
p =	
q =	
r =	
s =	
$\theta =$	
t =	
u =	
$\phi =$	
v =	
w =	

The angle-sum and angle-difference identities are listed below:

$$\sin(\alpha \pm \beta) = \sin(\alpha)\cos(\beta) \pm \cos(\alpha)\sin(\beta)$$

$$\cos(\alpha \pm \beta) = \cos(\alpha)\cos(\beta) \mp \sin(\alpha)\sin(\beta)$$

You know the following:

$$\sin(45^\circ) = \frac{\sqrt{2}}{2}$$

$$\sin(30^\circ) = \frac{1}{2}$$

$$\cos(45^\circ) = \frac{\sqrt{2}}{2}$$

$$\cos(30^\circ) = \frac{\sqrt{3}}{2}$$

Determine $\sin(-15^{\circ})$ exactly.

Prove the (sine) double-angle identity: $\sin(2x) = 2\sin(x)\cos(x)$

(Hint: start with an angle-sum formula from Question 2.)

Question 4

Prove the (cosine) double-angle identity: $cos(2x) = 2cos^2(x) - 1$

(Hint: start with an angle-sum formula from Question 2. Also, you will need to use the Pythagorean Identity: $\sin^2(x) + \cos^2(x) = 1$)

Prove the (cosine) half-angle identity: $\cos\left(\frac{y}{2}\right) = \pm\sqrt{\frac{1+\cos(y)}{2}}$.

 $({\it Hint: start with the double-angle identity from \ Question \ 4.})$

Question 6

Given $\cos(118^\circ) \approx -0.47$, what is $\cos(59^\circ)$? Please set up an expression, but do **not** try to simplify or evaluate a decimal approximation.

(Hint: 118/2 = 59.)